

## Article

# Actors in Water Governance: Barriers and Bridges for Coordination

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**Abstract:** Multiple actors across different institutional levels play a role in water governance. The coordination of these actors is important for effective water governance. However, the joining together of multiple actors can have several implications, such as a redistribution of power across actors, a change in democratic control and citizen influence as well as shifting accountability structures. These implications can involve different barriers and bridges that might impede or foster coordination. Through qualitative and quantitative methods, we assess the following barriers and bridges for coordination: (1) reputational power in terms of who is perceived as important for coordination in the water sector; (2) democratic legitimacy in terms of actors' value of local control of water services; and (3) accountability in terms of the regional actors' capacity to steer in the water sector. This article focuses on three cases in a Swiss region that has experienced water provision challenges due to its highly fragmented water supply structures. We find that reputational power serves as a bridge in our three cases: when the actors responsible for water supply regard potential coordination partners as important, then we observe coordination. In contrast, we do not find conclusive evidence to support the assumption that a fear of losing local control is a barrier for coordination. Instead, our results indicate that accountability, in the form of vertical steering by the regional actors, serves as a bridge for coordination, and that this could help mitigate some of the potentially negative effects of democratic legitimacy perceptions: through convening local actors or providing positive incentives to municipalities to work together, regional actors can foster coordination.

**Keywords:** coordination; water supply; social network analysis

## 1. Introduction

Water systems are experiencing highly dynamic and conflicting societal demands and environmental pressures [1]. Many of the prevailing and looming water crises are not necessarily due to water scarcity or a lack of technological expertise, but rather because of poor management and governance of available water resources and infrastructure [2,3]. The inability of current systems to address these issues has led to calls for increased coordination among key actors [4]. Multiple actors, both public and private, across different institutional levels, from local to international, play a role in water governance. On the one hand, typically municipalities have been delegated the responsibility to provide water services in cities [1]. On the other hand, regional, national and international as well as private actors may play an important role in terms of oversight, technical knowledge and funding.

In this paper, we consider coordination as the joining of two or more actors in providing water services. Coordination often initially involves actors at the same jurisdictional level [5]. Going beyond

this, coordination typically entails a whole network of organizations and entities that decide on and provide public tasks, rather than single public actors. This network of actors belongs to the public and private sphere and includes actors from different jurisdictional levels [6–10]. In short, coordination aims at establishing structures to enhance cooperation among a variety of actors to co-manage service provision [11–13]. We focus on “observable” coordination in the form of existing organizational structures, such as inter-municipal associations, through which actors jointly provide water services.

Different barriers and bridges might impede or foster coordination across multiple actors in the water sector. In this contribution, we focus on three aspects: reputational power, democratic legitimacy and accountability.

Firstly, coordination involves a redistribution of power amongst actors. Either municipal actors have to delegate a degree of power to an inter-municipal form of coordination or they might delegate this to regional (e.g., constituent state), private or even national actors. Therefore, a potentially important precondition for coordination among actors is the degree to which actors perceive each other as important and, hence, powerful [14–16]. Ideally, coordination could occur across levels (municipal, regional or national as well as public and private). However, as municipal actors historically play an important role in the provision of water provision [1], a first step would be the inter-municipal coordination. Hence, regarding fellow municipalities as important would arguably play a critical role for coordination. Following this, our first expectation is that if actors responsible for water provision regard other municipalities as important, then this serves as a bridge for coordination.

Second, coordination can be opposed at the local level, often because of citizens’ and local politicians’ participation concerns [17,18]. Indeed, urban water provision has traditionally enjoyed a high degree of citizen influence. With coordination reforms, the concern emerges that decision-making is no longer democratically legitimated if citizens can neither directly make decisions nor elect the people who manage their utilities [19,20]. This relates to democratic legitimacy, where direct and representative democratic elements such as citizens’ influence on public decision-making are considered key for acceptable policies [21]. Hence, strong democratic legitimacy, that is local actors’ value of democratic control, may hinder coordination [17,18]. A perceived democratic deficit at the local level has been found to be a barrier for coordination [18]. This leads us to our second expectation: Strong democratic legitimacy, and thus, actors’ value of local influence on service provision is a barrier for coordination.

Third, accountability mechanisms, such as the legal mandates traditionally fulfilled by public authorities, play an important role for coordination reforms [22,23]. The broader water governance literature typically defines accountability as a determinant of water sector performance [24]. Generally, the literature links accountability to hierarchical control, that is, the accountability of water officials to democratic institutions, as specified in water laws [23]. Hence, accountability is often tied to the degree of regulation for water quality, infrastructure maintenance, etc. [25]. The literature on accountability identifies many other (less hierarchical and less formal) accountability mechanisms, based on reputation and internal discretion such as accountability through the professional norms, media, and consumer choice [22,26,27]. For the purposes of this article, we focus on formal, hierarchical means of accountability. In federalist systems, the locus of accountability is typically at the regional level, as the municipalities must account to the regional water laws and officials [28]. We thus argue that the regional level has a capacity to steer the local or municipal level. Through this steering role, regional actors can support coordination through subsidies or mandates. Hence, a bridge for coordination may be strong accountability, where the government’s capacity to steer is desired and it has the necessary tools to do so [6,7,18]. Our third expectation is thus: Accountability, and thus a strong (perceived) capacity of the region to steer serves as a bridge for coordination.

Empirically, we assess these expectations in the water supply sector in Switzerland, which provides an interesting case to study coordination between municipalities and the regions (cantons) in a federal system. Switzerland’s key peculiarities of direct democracy make it an extreme case to study

democratic legitimacy and accountability issues. The water sector is salient for such an analysis of coordination, as it is characterized by high fragmentation [29].

The aim of this article is firstly to identify the degrees of coordination in the Swiss water supply sector and then shed light onto the bridges and barriers for such coordination. To do so, we proceed in four parts. We first specify our case selection and methods. In the empirical part, we then identify observed coordination by local and regional actors. Next, we outline the reputational power constellations using Social Network Analysis (SNA), and then assess legitimacy and accountability in the case studies. After discussing these results comparatively, we finally conclude with some suggestions for future research trajectories.

## 2. Materials and Methods

We have purposively selected the jurisdiction of the canton (region) Basel-Landschaft, in Switzerland, to conduct an analysis of the water supply sector because it has fragmented structures, but pursues coordination processes. Increasing water quality and quantity demands as well as climatic variations have led to growing challenges for these small water supply organizations to meet policy goals. In an effort to improve their performance, the region has driven processes of coordination, but the municipalities have largely resisted these reforms.

We have selected three case study areas within Basel-Landschaft that face different challenges: Case 1 includes 18 municipalities and is peri-urban with water quality concerns in the context of flooding and droughts. Case 1 spans a hydrogeological “water region” that cuts across canton Basel-Landschaft and the neighboring canton Solothurn. This is why we have included the canton of Solothurn in the interviews (see Appendix B). Case 2 encompasses eight municipalities and is rural with water quantity challenges, as hillside municipalities experience water shortages during droughts and are dependent on the water-rich valley municipalities. Case 3 spans 19 municipalities, is urban, and faces water quality concerns due to the river Rhine and nearby industrial deposits. Case 3 spans a hydrogeological “water region” that cuts across canton Basel-Landschaft and neighboring cantons, Basel City and Solothurn. This is why we have included the latter two cantons in the interviews (see Appendix B).

Our data comprise archival and documentary sources (laws and regulations) on the one hand, and 23 semi-structured, in-person interviews on the other hand. Appendix B contains the list of the interviewees. The interviews were conducted between June 2013 and February 2014, lasted between 60 and 90 min, and were recorded and transcribed.

To operationalize our dependent variable, we assessed the extent to which coordination is occurring in the cases. We did this based on an analysis of the existing organizational structures in terms of legal forms. That is, we first looked at the number of inter-municipal associations or joint-stock corporations through which the local actors jointly provide water services. Second, we also asked interview partners about ongoing processes to increase coordination. Third, we conducted a qualitative assessment about who retains decision-making competence. A high degree of coordination is defined as a situation with only a single inter-municipal organization where the local, municipal level retains little control. A low level of coordination is when the municipalities each operate their own water service system. A moderate degree of coordination involves a mix of inter-municipal associations, joint-stock-corporations and individual municipal waterworks.

The subsequent research steps involved document analysis and semi-structured interviews. To assess reputational power, we identified the key actors in all three cases. We did this by pinpointing the leading agency responsible for water services at the regional level, as well as one project leader at the local level as the two starting points for our snowball sampling. Through scoping interviews with these actors per region, we identified additional actors, whom we also interviewed. This resulted in 8 interview partners for Case 1 and 9 interview partners in both Cases 2 and 3. We systematically asked these actors (called “the core”) whom they perceived as important actors for water supply. In this way,

we were able to compile a list of 52, 46 and 42 collective actors and organizations, respectively, coding them by their jurisdictional level (local, regional, national) and sector (private or public).

To assess the reputational power of single actors in the network, we based our analysis on two measures borrowed from Social Network Analysis (SNA). SNA assumes that formal and informal arrangements and the involvement of a variety of actors are crucial for coordination [30]. In this context, we define nodes in the network as public and private, including local, regional and national organizations that are involved in the water supply sector (be it through management, regulation, or supply and consumption). A tie in the network is drawn as soon as an organization mentions another organization as important. It is thus a so-called directed network. We first calculate network density per case and, thus, the share of observed relations compared to all possible relations in one network [31]. Yet density is very sensitive to response rates in a network and to node-number per network [32]. This is why we predominantly concentrated on the densities within our core networks, as we have full data on these (all interview partners). Densities of the core indicate whether what we initially identified as the most important actors in the cases are also perceived as such by the concerned actors. In-degree centrality, that is the number of times the same actor is mentioned several times by various interview partners, is the second indicator for reputational power. The more the same set of actors are mentioned as being important (having high in-degree centrality), the more they are, thus, tightly linked to the core of the network. Network densities and in-degree centralities were calculated using UCINET 6.0 software.

We first measured democratic legitimacy in terms of citizens' rights to elect those responsible for service provision into office and to vote on projects and expenditure [20,33]. This provides us with an indication of the formal democratic legitimacy as specified in the legislation. We then further assessed legitimacy by asking interview partners how they perceive citizen influence and local competence in relation to water service provision. That is, whether they value having a high degree of democratic influence, which includes local competences and control over water services, and how this serves as a bridge or barrier for coordination. This second component of the legitimacy analysis enables us to identify the perceived democratic legitimacy in relation to bridges and barriers for coordination. We realize that the formal and informal (values) may be interlinked, but what is interesting is that the formal democratic legitimacy is constant across the three cases and the values are different.

Finally, we assessed accountability in terms of the degree of the regional government's capacity to steer [21]. Again, to identify the formal mechanisms, we first analyzed the relevant laws to pinpoint the type of steering tools that the regional (cantonal) actors have vis-à-vis municipalities. We defined steering tools as including planning processes, making recommendations, issuing mandates and fines, denying concessions, or providing subsidies. We then asked interview partners about which instruments are actually employed and how they perceive the regional government's capacity to steer, whether they prefer stronger or weaker steering and how the regional government's capacity to steer serves as bridges or barriers for coordination. We define stronger tools as those with more force (e.g., denying concessions, giving fines or subsidies) and weaker tools as those with less force (e.g., making recommendations, planning processes). Again, we realize that the formally possible and the actually employed and perceived accountability mechanisms may be interlinked. However, and again, the former is constant across the three cases and the latter are different.

### 3. Results

#### 3.1. Coordination

The organizational analysis shows that Case 1 has a moderate degree of coordination, as there are five municipal water suppliers, one municipal waterworks that supplies additional municipalities, three inter-municipal associations and one inter-municipal joint-stock corporation (see Table 1). According to our interviews, we found that the inter-municipal organizations have been constructed in such a way that the municipalities have retained a high degree of control, as the individual

municipalities can strongly affect the decisions. The municipalities running their own waterworks have been involved in a process to join in a new organizational form, but this has not materialized thus far.

**Table 1.** Overview of water suppliers and types in Case 1.

Name	Type
1. Wahlen Municipality	Municipal water works
2. Dittingen Municipality	Municipal water works
3. Kleinlützel Municipality	Municipal water works
4. Röschenz Municipality	Municipal water works
5. Liesberg Municipality	Municipal water works
6. City of Laufen	Municipal water works, but supplies three municipalities
7. Water Federation Birstal	Inter-municipal association (task-specific association for water supply)
8. Lüsseltaler Water Association	Inter-municipal association (task-specific association for water supply)
9. Water Supply Gilgenberg	Inter-municipal association (task-specific association for water supply)
10. Regional Water Supply Birstal-Thierstein	Inter-municipal joint-stock corporation (stockholders are all public)

Case 2 involves high coordination: there is one inter-municipal joint-stock corporation that serves as a water distributor between the municipalities across the entire case area (see Table 2). The municipalities retain only a minimal degree of influence as delegates sit on the board of directors. The corporation owns the reservoirs and regional distribution pipes, while the municipalities own their own water supply structure and retain water rights. There has been a process to integrate the municipalities further into the corporation (through joint-ownership and joint water rights) but this has not been successful thus far.

**Table 2.** Overview of water suppliers and types in Case 2.

Name	Type
Water Supply Waldenburgertal	Inter-municipal joint-stock corporation (all stockholders are public) Redistribution of water between municipalities as follows: Water supplying municipalities: Hölstein, Oberdorf, Niederdorf Water receiving municipalities: Arboldswil, Bennwil, Lampenberg, Ramlingen, Waldenburg

Like Case 1, Case 3 has a moderate degree of coordination, as there are four municipal waterworks, two inter-municipal associations, and one inter-municipal joint-stock corporation (see Table 3). A process to increase coordination by joining all waterworks together has been underway, but has failed to date. Comparatively, the degree of coordination is slightly higher in Case 3 than Case 1, as there are fewer organizational forms, despite having slightly more municipalities (19 vs. 18 municipalities).

**Table 3.** Overview of water suppliers and types in Case 3.

Name	Type
1. Münchenstein Municipality	Municipal water works
2. Arlesheim Municipality	Municipal water works
3. Birsfelden Municipality	Municipal water works
4. Muttenz Municipality	Municipal water works
5. Task-specific association Waterworks Reinach Region	Inter-municipal association (task-specific association for water supply)
6. Task-specific association Aesch, Dornach and Pfeffingen (Basel-Landschaft and Solothurn)	Inter-municipal association (task-specific association for water supply)
7. Joint-stock company Hardwasser AG	Inter-municipal joint-stock corporation (all stockholders are public)

### 3.2. Reputational Power

By asking core actors at the local and regional level about whom they perceive as important in the water supply sector of Basel-Landschaft, we found that national actors are not perceived as playing a prominent role in water service provision. The regional actors, the municipalities and inter-municipal organizations enjoy the highest reputational power. Private actors, such as consultancies, do not play a central role. However, both the regional actors and the municipalities contract them to accomplish tasks and enjoy a degree of reputational power.

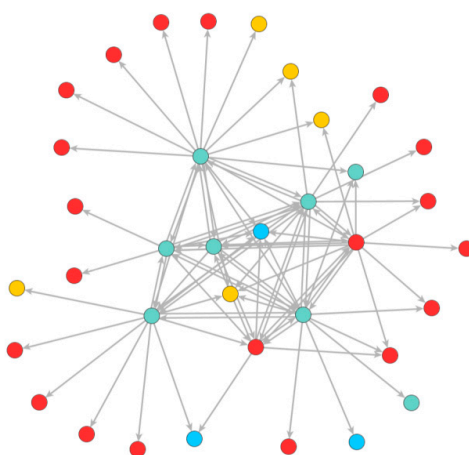
Table 4 summarizes data about the core actors in each case who we interviewed as well as all the actors named as important in the case. We specify the share of local, regional, national and public–private actors as well as two network measures, in-degree centrality and densities. Density is an appropriate measure for the core of the network: All interview partners comprising this core had the opportunity to mention all other interview partners as important actors. In this local and very sector-specific context, one can expect that potentially important actors know each other. This is why a density in the core below 50% can be considered as low, and everything above 50% can be considered as high. The maximum density would be 1. The in-degree centrality then shows how many times local actors, such as municipalities or waterworks, were mentioned to be important and are, thus, connected to the core of the network. One word of caution concerning the density measure of the whole network: these are not complete networks, meaning that only one-fifth of the actors in the network actually gave their judgments about whom they perceive as important (but we controlled for this when calculating densities). This picture could look very different if at least 50% of all actors in these networks had answered the question about whom they perceive as important. However, these network constellations provide us with insight regarding who the relevant actors are for coordination processes.

**Table 4.** Reputational power in three cases.

	Total Number of Actors	Local	Regional	National	Private	Avg. In-Degree Local	Density
<b>Case 1</b>							
<b>Core</b>	8	6 (75%)	2 (25%)	0	0	5.5	80%
<b>All</b>	52	26 (50%)	10 (23%)	6 (14%)	7 (16%)	2.4	30%
<b>Case 2</b>							
<b>Core</b>	9	8 (88%)	1 (11%)	0	0	5.6	65%
<b>All</b>	46	21 (46%)	12 (26%)	6 (13%)	7 (15%)	3.71	32%
<b>Case 3</b>							
<b>Core</b>	9	7 (78%)	2 (22%)	0	0	4.86	50%
<b>All</b>	42	21 (50%)	12 (29%)	5 (12%)	4 (9%)	3.14	26%

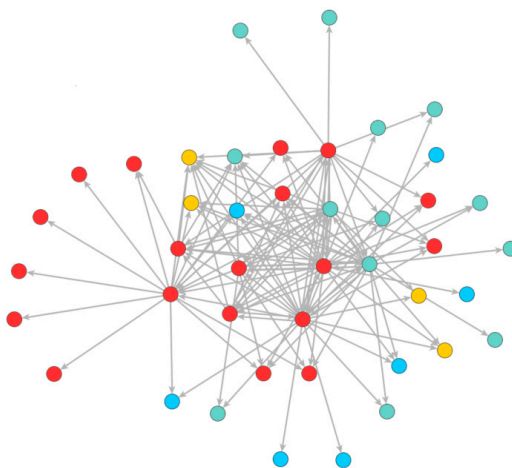
Case 1 is the biggest network compared to the others. Fifty percent of the actors perceived as important in the water sector are local actors (red nodes) and 23% are regional (cantonal) actors (turquoise nodes). The local actors are only loosely connected to the core (average in-degree centrality of 2.4, Table 4, Case 1; see also Table A1 in the Appendix A). Interestingly, the interview partners prominently perceive regional actors (Table A1 in Appendix A; and turquoise nodes in Figure 1) as important players in the water sector in Case 1. The national actors (blue nodes) and the private actors (orange nodes) are far fewer and generally (with two exceptions) at the periphery of the network and, hence, have a low degree of reputational power.





**Figure 1.** Power in Case 1. Legend: Having 8 interview partners and 52 actors in this network, 408 connections are possible, and 124 were observed, which results in a density of 0.30. The overall density (considering all potential relations if all the nodes had been active) is 0.047. Red = municipal/local; Turquoise = cantonal/regional; Blue = national; Orange = private.

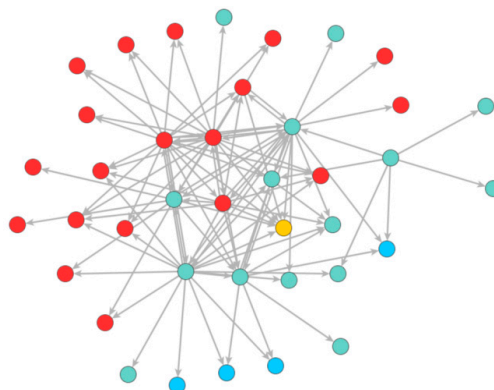
Similar to Case 1, in Case 2 almost half of the actors that were mentioned as being important for water supply were local actors and 26% (red nodes) were regional actors (turquoise nodes; Figure 2). In contrast to Case 1, a key aspect in Case 2 is that the local actors are well connected to the core (average in-degree centrality of 3.71, Table 4, Case 2; see also Table A2 in Appendix A and red nodes at the center of Figure 2) whereas regional actors (turquoise nodes; Figure 2) are not considered very important. In contrast to Case 1, more national actors (blue nodes) are identified as important, but generally at the periphery. The private actors (orange nodes) are fewer and at the periphery with lower importance.



**Figure 2.** Power in Case 2. Legend: Having 9 interview partners and 46 actors in this network, 414 connections are possible, and 132 were observed, which results in a density of 0.32. The overall density (considering all potential relations if all the nodes had been active) is 0.064. Red = municipal/local; Turquoise = cantonal/regional; Blue = national; Orange = private.

Like the other two cases, the interview partners mainly named local actors (red nodes) as important for water provision (50%; Table 4, Case 3) in Case 3. However, there is a separation into a divided core–periphery structure (see Figure 3): one consisting of municipal actors (red nodes) and the other of mainly regional actors (turquoise nodes). Municipal actors in the periphery only link to municipal actors in the core, and regional actors in the periphery only link to regional actors in the core. Furthermore, regional actors also build a cluster internally linked to each other. Here we find that regional and local actors do not seem to perceive each other as important for water provision.

The in-degree centrality is between that of Case 1 and 3 (average in-degree centrality of 3.14, Table 4, Case 3; see also Table A3 in Appendix A). In addition, and in contrast to the other two cases, the national actors (blue nodes) are most clearly at the periphery. Private actors (orange node) have the least importance in this case.



**Figure 3.** Power in Case 3. Legend: Having 9 interview partners and 42 actors in this network, 378 connections are possible, and 104 were observed, which results in a density of 0.26. The overall density (considering all potential relations if all the nodes had been active) is 0.060. Red = municipal/local; Turquoise = cantonal/regional; Blue = national; Orange = private.

In sum, we find that municipalities and inter-municipal organizations are both perceived as the most important across all cases (approximately 50%). As such, municipalities and inter-municipal organizations have the highest reputational power, regional actors have the second highest, and national and private actors have the least.

### 3.3. Democratic Legitimacy

All three cases have historically had strong democratic legitimacy. According to the cantonal law, the regional government has the formal decision-making rights and discretion to intervene at the local level to safeguard water supply in its territory. However, the regional government has delegated operational competence to the municipalities. Hence, municipal councils control the operational decisions about water supply when the municipality provides water (through municipal waterworks). Citizens have historically had a high degree of influence on the current structures, both indirectly by electing their municipal councilors and directly by voting on large financial projects in the context of municipal waterworks. Even in the case of inter-municipal organizations, the municipal councilors sit on the board and make decisions. However, in such arrangements, the citizens can no longer vote on large financial projects. In Switzerland, the legal form of joint-stock corporations means that the municipalities have less control than inter-municipal associations. Hence, a joint-stock corporation means less democratic legitimacy than inter-municipal associations.

In Case 1, interview data indicate that the actors' values of democratic legitimacy are the lowest, compared to the other two cases. That is, the interview partners do not place a high level of importance on having an influence on their water provision. Instead, interviewees state that the difficulty in deciding which competences the individual municipalities should give up and the need to clarify the financial redistribution are the main factors that have created barriers for reforms (Interviews 3, 4, 5, 8). While the former concern links to democratic legitimacy, as there is fear of losing local competences and responsibilities, the latter has more to do with financial fairness. This latter aspect can potentially be better solved at the regional rather than the local level, as the higher institutional level is responsible for deciding redistribution across subsidiary actors. Hence, this also serves as an indicator that these actors are rather open to the involvement of actors at the regional level and place a low value on democratic legitimacy.



In Case 2, we find democratic legitimacy values to fall between Cases 1 and 3. This is primarily because we find a more differentiated perception of democratic legitimacy here than in the other two cases. The values of citizen influence and local competences remain high in the water-rich valley municipalities, as interviewees from the valleys express concern of losing their direct control over decision-making (Interviews 9, 11, 13, 15). Conversely, the hillside municipalities prioritize engaging in inter-municipal coordination with the valley municipalities over direct democratic influence, to safeguard their water supply (Interviews 10, 12, 14; see above). Overall, the hillside and valley municipalities tend to block in each other in decision-making processes.

In Case 3, values of citizen influence and local competences are the highest in comparison to the other two cases. Here, several interviewees state that the municipalities want to retain sovereignty over local water supply and that citizens' ability to influence their local water supplier is considered a high priority (Interviews 19, 21, 22, 23). One interviewee explains that "citizens' ability to directly influence their local water supply is fundamental, as this water is a key public service" (Interview 21). What is more, this interviewee continues, is that people in this area want their water to come from their municipality and not from a neighbor or distant water supplier. Several interviewee partners were concerned about the quality of water provided by the joint-stock company, which draws its water from infiltrated Rhine groundwater (Interviews 19, 21, 22). Accordingly, the high priority of democratic control alongside water quality concerns has been found to be a barrier for coordination.

### 3.4. Accountability

Basel-Landschaft has a range of steering tools: the ability to grant or deny concessions for water use, issue mandates and fines, and create Regional Water Supply Plans. However, a regional interviewee says, "The canton lacks strong policy instruments to put pressure on the municipalities ( . . . )" (Interview 3) and, hence, cannot strongly promote coordination. Moreover, instead of using mandates and denying concessions, the region has employed weaker steering tools, such as funding planning processes for coordination.

Overall accountability is found to be moderate in Case 1; the regional actors have neither engaged in a planning process nor in providing subsidies or issuing mandates to coordinate. The local actors in this case wish that the regional actors would take on a stronger steering role, as they perceive this as a bridge for coordination. Comparatively, the capacity to steer has been the strongest in Case 2, where the region has been more active in convening the local actors in planning processes than in the other two cases. This has served as a bridge for coordination (Interview 1.2). Similar to Case 1, the canton has not engaged actively in steering Case 3. However, unlike Case 1, in Case 3 the actors are most averse to stronger regional steering and, hence, accountability is the weakest here, which has blocked coordination reforms.

Interviewees in all three cases have indicated that the region particularly lacks incentive-based steering tools. They argue that strong financial incentives could serve as an important means for the region to steer. All local actors would rather be encouraged by incentives and want the regional government to serve as facilitators for coordination processes; they do not want the regional government to give them mandates (Interviews 3–23).

## 4. Discussion

We now discuss the observed coordination in relation to the bridges and barriers of reputational power, democratic legitimacy and accountability for our three cases.

In Case 1, we observe a moderate degree of coordination in comparison with the other two cases, as there are both municipal waterworks and inter-municipal organizations. Our analysis of reputational power helps to explain a lack of further coordination within Case 1: the regional actors have the highest reputational power in this network, as the interview partners regard these as the most important. In line with our first expectation, this form of reputational power seems to be a barrier for coordination as the key partners for inter-municipal coordination are the municipalities, but the

municipalities do not all regard each other as important. However, coordination by a regional actor (that is the canton) could be an option in this region, as the regional actors are considered the most important. Similarly, the results on democratic legitimacy show that the actors do not place a high value on having local influence on their water provider. These actors also regard financial redistribution as a barrier toward coordination, which can potentially be better solved at the regional rather than the local level. Hence, it is not surprising that the interview partners find regional actors more important for water provision than local actors. The low degree of importance placed on democratic legitimacy has not led to a high degree of coordination, but rather a moderate degree of coordination. We thus find inconclusive evidence for our second expectation. Finally, we turn to accountability, where we find that the regional actors have had only a moderate steering capacity, despite the wishes of the local actors that the regional actors take a stronger steering stance, as they regard stronger accountability as a bridge for coordination. This positive perception of accountability for coordination supports our third expectation.

Case 2 is the most coordinated of all the three cases, as there is one inter-municipal organization distributing water across all the municipalities. Our analysis of reputational power helps to explain this. While all the cases have a considerable overall density, only in Case 2, we find that a variety of municipalities are regarded as important and connect to the core of the network. This supports our first expectation that if fellow municipalities are considered as important for water provision, then this is a bridge for coordination. In contrast, the coordination in Case 2 cannot be conclusively explained by our analysis of democratic legitimacy, which we find to be moderate, due to the diverging interests of the hillside and valley municipalities who block each other. Hence, we can neither support nor counter our expectation. Finally, in line with our third expectation, accountability seems to be an important bridge for coordination in this case. Accountability is the strongest in Case 2 and we observe the highest coordination.

In Case 3, coordination is also moderate albeit slightly higher than in Case 1, as there are fewer organizational forms. Nevertheless, several individual municipal waterworks and inter-municipal organizations exist. Reputational power helps to explain this form of coordination, as we find a clear core-periphery structure where municipal and regional actors only link to their peers (municipal versus regional actors, respectively). In contrast to Case 2, there is no strong integrated core of municipal actors in this network. This provides a negative affirmation for our first expectation, as this lack of regarding fellow municipalities as important seems to impede coordination. Our results on democratic legitimacy for Case 3 also support our second expectation, as we find a high concern (the highest of the three cases) about a loss of democratic legitimacy in this case, which is a barrier for coordination. Conversely, and in line with our third expectation, we find that accountability in terms of the capacity to steer is the weakest in this case, which impedes coordination: the local actors in this case place the least amount of emphasis on the value of the regional government's steering capacity. This is also supported by the findings on reputational power, which shows that the local actors do not regard the regional actors as important.

## 5. Conclusions

The current and often highly fragmented water supply structures face different socio-economic, technical and biophysical challenges, even in highly industrialized countries [29]. To address these difficulties and in order to deliver water of good quality and sufficient quantities, reforms have called for municipalities to join forces and coordinate. In this article, we focused on coordination as involving the joining of two or more actors to provide water services. To effectively (or not) provide public services through coordination, such reforms first need to be realized, which often depends on power relations as well as procedural aspects such as democratic legitimacy and accountability. We have thus addressed three central bridges and barriers in the context of coordination: reputational power, democratic legitimacy and accountability. We then studied coordination in the Swiss water supply sector in Basel-Landschaft via social network analysis and interviews.

As coordination involves a redistribution of power across actors, we first argued that reputational power matters for coordination. Put differently, if actors regard potential coordinating partners—that is, the municipalities—as important, then this is a bridge for coordination. We indeed found that municipal as well as regional actors enjoy the highest reputational power across our three cases and that it is the municipal actors that have engaged in coordination. In line with our first expectation, we found that if municipal actors responsible for water service provision regard other municipalities as important, then they are more likely to engage in actual coordination. The negative affirmation of this was confirmed in Cases 1 and 3. In the former, the interview partners mainly perceive the regional actors, rather than the municipal actors, as important and we found moderate coordination. In the latter, we found a core-periphery structure without integration of the municipal actors. Finally, our expectation on reputational power was affirmed positively in Case 2, where a variety of actors is regarded as important and where we found the strongest coordination.

Second, we posited that a high preference for democratic legitimacy, with strong values of local control and influence, is a barrier for coordination. Case 3 provides the strongest evidence to support this, as our expected negative link between local actors' prioritization of democratic control and effects on coordination reforms was largely confirmed. However, despite a high concern about democratic legitimacy, Case 3 has slightly higher coordination than Case 1, where we observe low concern about democratic legitimacy. Indeed, our other two cases provide inconclusive evidence on for this link between democratic legitimacy and coordination: In Case 1, we found that the actors do not prioritize democratic legitimacy, but also consider arguments of financial redistribution in the context of coordination, which might be more aptly solved at the regional rather than the local level. Despite low values of democratic legitimacy, we only found moderate coordination in Case 1, rather than the expected high level. In Case 2, we found that the hillside and valley municipalities largely blocked each other with their contrasting viewpoints on democratic legitimacy, leading to moderate legitimacy, but high coordination. In contrast to this lack of explanatory power of democratic legitimacy as a bridge or barrier, we found that accountability is valuable. Indeed, our third expectation was that accountability, in terms of the region's capacity to steer, serves as a bridge for coordination. In all three cases, our results support the expected positive link between accountability and coordination: the stronger the observed or desired region's capacity to steer, the stronger the coordination. Concretely, the regional actor serving as a convener of the local actors in planning processes is a bridge for coordination (Case 2). Moreover, local actors in all cases say that they regard positive incentives (payments) by the regional actors as bridges for coordination. In contrast, an aversion to steering from the regional level seems to be a barrier for coordination (Case 3). This concurs with previous studies that have found that steering from a higher institutional level is often required to foster coordination [28].

To summarize, we have found the following bridges and barriers for coordination in this study. Reputational power serves as a bridge, as we found that if actors responsible for water provision regard potential coordination partners as important, then we observe a higher degree of coordination. We have not found conclusive evidence that high democratic legitimacy (strong local values of control and influence) is a barrier for coordination. In contrast, we have found that accountability, in the form of vertical steering by the regional actors, serves as a bridge for coordination.

These findings from the Swiss case of water supply in Basel-Landschaft are relevant to other federal countries where local autonomy is juxtaposed with the clout of regions (in this case cantons), albeit perceptions of democratic legitimacy might vary between localities. Moreover, democratic legitimacy, and particularly the value of municipal control, is not only salient in Switzerland but also across Western Europe, where we have seen recent citizen-initiated waves of re-municipalization of outsourced public services [34].

**Author Contributions:** E.L. and K.I. conceived and designed the research approach; K.I. conceptualized the reputational power part. E.L. conceptualized the coordination, democratic legitimacy and accountability parts. E.L. conducted the empirical analysis. Both co-authors wrote the paper.

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## Appendix A

**Table A1.** In-degree centralities in Case 1.

Actor Type	Actor (Total n = 52)	In-Degree Centrality (Max. 8)
Regional actors N = 14	Bureau of Environmental Protection and Energy Basel-Landschaft	6
	Drinking Water Inspector of the region Basel-Landschaft	6
	Bureau of Environment Solothurn	6
	Drinking Water Inspector of the region Solothurn	3
	Building Insurance Solothurn	3
	University of Basel	3
	Bureau for Military and Population Protection Basel-Landschaft	2
	Industrial Works Basel (City)	2
	Government of the Region Basel-Landschaft	1
	Fire Inspector and Building Insurance Basel-Landschaft	1
	Region Basel-City	1
	Government of the region Solothurn	1
	Building, Planning and Environmental Director Conference	1
	Association of region Chemists	1
National actors N = 5	Swiss National Association for Gas and Water	6
	Swiss Association of Drinking Water Technicians	2
	Federal Office of Food Security and Veterinary Issues	1
	Federal Office of the Environment	1
	Swiss Federal Institute of Aquatic Science and Technology	1
Municipal actors N = 26	Water network “Birstal”	7
	Drinking water technicians for the joint-stock corporation regional water supply “Birstal-Thierstein” (RWV) and Water network “Birstal”	6
	Joint-stock corporation regional water supply “Birstal-Thierstein”	6
	Water supply “Lüsseltal” (Solothurn and Basel-Landschaft)	5
	City of “Laufen”	5
	Drinking water technicians City of “Laufen”	4
	Water network “Gilgenberg”	4
	Drinking water technician Water supply “Lüsseltal”	3
	Municipality of Röschenz	3
	Drinking water technician Water Supply “Gilgenberg”	2
	Municipality of Dittingen	2
	Municipality of Zwingen	2
	Municipality of Wahlen	1
	Municipality of Liesberg	1
	Municipality of Kleinlützel	1
	Municipality of Blauen	1
	Municipality of Nenzlingen	1
	Municipality of Brislach	1
	Municipality of Breitenbach	1
	Municipality of Büsserach	1
	Municipality of Erschwil	1
	Municipality of Meltingen	1
	Municipality of Fehren	1
	Municipality of Zullwil	1
	Municipality of Nunningen	1
	Municipality of Himmelried	1

Table A1. Cont.

Actor Type	Actor (Total n = 52)	In-Degree Centrality (Max. 8)
Private actors N = 7	Consultancy Sutter	5
	Accountancy firm BDO Visura (joint-stock corporation)	2
	Consultancy Holinger	2
	Water technician joint-stock corporation Heinis	1
	Consultancy Schmidlin und Partner	1
	Consultancy Lienhard	1
	Industry and Chamber of Commerce	1

Table A2. In-degree centralities in Case 2.

Actor Type	Actor (Total n = 46)	In-Degree Centrality (Max. 9)
Regional actors N = 12	Bureau of Environmental Protection and Energy Basel-Landschaft	8
	Region Drinking Water Inspector Basel-Landschaft	7
	Bureau of Industrial Services Basel-Landschaft	2
	Directorate of Finances and Church	2
	Government of the region Basel-Landschaft	2
	University of Basel	2
	Bureau for Spatial Planning Basel-Landschaft	1
	Region Basel-City	1
	Regional Leadership and Civil Protection	1
	Bureau of Statistics Basel-Landschaft	1
	Bureau for Military and Population Protection Basel-Landschaft	0
	Industrial Works Basel (City)	0
National actors N = 6	Swiss National Association for Gas and Water	4
	Swiss Federal Institute of Aquatic Science and Technology	3
	Swiss Association of Drinking Water Technicians	2
	“Aqua Viva” Swiss Action Group for the Protection of Rivers and Lakes	1
	Federal Office of the Environment	1
	Federal Office of Food Security and Veterinary Issues	1
Municipal actors N = 21	Municipality of Niederdorf	7
	Municipality of Arboldswil	6
	Municipality of Hölstein	6
	Municipality of Oberdorf	6
	Joint-stock corporation water supply Waldenburgertal	6
	Drinking water technician Joint-stock corporation water supply Waldenburgertal	5
	Municipality of Ramlinsburg	5
	Municipality of Waldenburg	5
	Municipality of Bennwil	4
	Drinking water technician of Niederdorf	4
	Drinking water technician of Oberdorf	4
	Municipality of Lampenberg	4
	Drinking water technician of Hölstein	3
	Municipality of Langenbruck	3
	Association of Basel-Landschaft Municipalities	3
	Drinking water technician of Arboldswil	2
	Drinking water technician of Bennwil	1
	Drinking water technician of Lampenberg	1
	Drinking water technician of Langenbruck	1
	Drinking water technician of Ramlinsburg	1
	Drinking water technician of Waldenburg	1

Table A2. Cont.

Actor Type	Actor (Total n = 46)	In-Degree Centrality (Max. 9)
Private actors N = 7	Consultancy Sutter	9
	Consultancy GRG	5
	Consultancy Holinger	3
	Accountancy firm Schneeberger	2
	Aqua Plus (private partnership firm)	1
	Elektra Basel-Landschaft (cooperative)	1
	Industry and Chamber of Commerce	0

Table A3. In-degree centralities in Case 3.

Actor Type	Actor (Total n = 42)	In-Degree Centrality (Max. 9)
Regional actors N = 12	Bureau of Environmental Protection and Energy	9
	Industrial Works Basel (City)	5
	Region Drinking Water Inspector Basel-Landschaft	5
	Building Insurance Solothurn	2
	University of Basel	2
	Bureau of Environment Solothurn	1
	Bureau of Industrial Services Basel-Landschaft	1
	Bureau for Military and Population Protection	1
	Association of drinking water technicians Basel-Landschaft	1
	Region Drinking Water Inspector Solothurn	1
	Government of the region Basel-Landschaft	1
	Region Basel-City	0
National actors N = 5	Swiss National Association for Gas and Water	3
	Swiss Federal Institute of Aquatic Science and Technology	2
	Swiss Association of Drinking Water Technicians	2
	Federal Office of the Environment	0
	Federal Office of Food Security and Veterinary Issues	0
Municipal actors N = 21	Joint-stock company Hardwasser AG	6
	Municipality of Münchenstein	6
	Task-specific association Waterworks Reinach Region	6
	Municipality of Aesch	4
	Municipality of Arlesheim	4
	Municipality of Birsfelden	4
	Municipality of Dornach Solothurn	4
	Municipality of Muttenz	4
	Municipality of Pfeffingen	4
	Task-specific association Aesch, Dornach and Pfeffingen (Basel-Landschaft and Solothurn)	4
	Municipality of Bottmingen	3
	Municipality of Biel-Benken	2
	Drinking water technician of Waterworks Reinach Region	2
	Drinking water technician of task-specific association Aesch, Dornach and Pfeffingen (ZV ADP) (Basel-Landschaft and Solothurn)	2
	Municipality of Ettingen	2
	Municipality of Oberwil	2
	Municipality of Reinach	2
	Municipality of Therwil	2
	Municipality of Allschwil	1
	Drinking water technician of Hardwasser AG	1
	Drinking water technician of Industrial Works Basel	1
Private actors N = 4	Consultancy Holinger	7
	Consultancy Heinis AG	1
	Pharmaceutical Industry	1
	Industry and Chamber of Commerce	1



## Appendix B

### Interviewee list

No.	Actor	No. of People	Date
<b>Region</b>			
1.1	Bureau of Environmental Protection and Energy Basel-Landschaft Representatives	2	2013
1.2			
2.1	Bureau of Environment Solothurn Representative	1	2013
2.2	Industrial Works Basel (City)	2	2014
<b>Case 1</b>			
3	City councilor of the city of Laufen	1	2013
4	President of water network Gilgenberg	1	2013
5	President of joint-stock corporation regional water supply Birstal-Thierstein	1	2013
6	President of waterworks Birstal	1	2013
7	Drinking water technician for the joint-stock corporation regional water supply Birstal-Thierstein and Waterworks Birstal	1	2013
8	President of water supply Lüsseltal (Solothurn and Basel-Landschaft)	1	2013
<b>Case 2</b>			
9	President of joint-stock corporation water supply Waldenburgertal	2	2013
10	City councilor of Arboldswil municipality	1	2013
11	City councilor of Niederdorf municipality	1	2013
12	City councilor of Waldenburg municipality	1	2013
13	City councilor of Hölstein municipality	1	2013
14	City councilor of Lampenberg municipality	1	2014
15	City councilor of Oberdorf municipality	1	2013
16	City councilors of Ramlinsburg municipality	3	2013
<b>Case 3</b>			
17	President of joint-stock company Hardwasser AG	1	2014
18	President of task-specific association Waterworks Reinach Region	1	2014
19	City councilor of municipality of Münchenstein	2	2014
20	President of task-specific association Aesch, Dornach and Pfeffingen (Basel-Landschaft and Solothurn)	1	2014
21	City councilors of Arlesheim municipality	2	2014
22	City councilors of Muttentz municipality	3	2014
23	City councilors of Birsfelden municipality	2	2014

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